Appendix D

Description of Proposed B1 Waters for the White River Basin (all waters begin below 2500 feet)

- Middle Brook and all tributaries from its headwaters to its confluence with and including its western most tributary
- Jimmy Dean Brook and all tributaries from its headwaters to the Pittsfield-Chittenden town line
- Townsend Brook and all its tributaries to the Chittenden-Pittsfield town line
- The West Branch of the Tweed River upstream of the Pittsfield-Chittenden town line and all the tributaries to that section of the West Branch including Caryl Brook, Hayes Brook, Slab Bridge Brook, Morrill Brook and Michigan Brook
- Guernsey Brook and all of its tributaries west of Town Highway 2 (a.k.a. Forsha Road)
- Corporation Brook and all of its tributaries from its headwaters to its confluence with and including the brook's southern most tributary in Rochester
- Perkins Brook from its headwaters to the furthest downstream Green Mountain National Forest boundary
- All the tributaries to Brandon Brook upstream of the Brandon Brook and Bingo Brook confluence including Smith Brook, Joe Smith Brook and Chittenden Brook
- Bingo Brook and all of its tributaries from its headwaters to its confluence with Brandon Brook including Perkins Brook, Pine Brook, and Falls Brook.
- Tunnel Brook and all of its tributaries from its headwaters to the furthest downstream Green Mountain National Forest boundary
- Piper Brook and all tributaries from its headwaters to Route 125.
- Boyden Brook and all tributaries from its headwaters to Route 125.
- Grindstone Brook and tributaries from its headwaters to Route 125.
- Hancock Branch and all its tributaries including George Brook and Texas Brook from its headwaters to its confluence with Robbins Branch.
- Taylor Brook and all its tributaries from its headwaters to Route 125.
- Tucker Brook and all its tributaries from its headwaters to Route 125
- Allbee Brook and all tributaries within the Green Mountain National Forest
- White River and all its tributaries from its headwaters to its confluence with Gulf Brook including Gulf Brook, Patterson Brook and Clark Brook.
- All unnamed streams not previously described located predominately within the Green Mountain National Forest from their headwaters to the furthest downstream Green Mountain National Forest boundary except:
    - Wings Brook

    - The northern most western tributary to the White River mainstem within the Green Mountain National Forest in Rochester
    - The second most northern tributary to the White River mainstem within the Green Mountain National Forest in Stockbridge
    - The second tributary to the White River mainstem north of the Pittsfield-Rochester town line

- Alder Meadow Brook from its headwaters to its confluence with the White River and all tributaries located predominately within the Granville Reservation State Park or the Green Mountain National Forest including Deer Hollow Brook

- Northern most tributary to Kendall Brook from its headwaters to the furthest downstream boundary of the Granville Reservation State Park

- Woodard, Flint and all tributaries from headwaters to the boundary of the Roxbury State Forest.

- Sandusky Brook and all tributaries above 1800 feet

- All unnamed streams on the east side of Route 12A that flow through Roxbury State Forest from their headwaters to the most downstream state forest boundary

- Thayer Brook and all tributaries from the headwaters to the furthest downstream Rochester Wildlife Management Area boundary

- The southern and the northern most tributaries of an unnamed stream in the Ainsworth State Park from their headwaters to their confluence with the unnamed stream

- Batchellor Brook and all tributaries from its headwaters to Route 12A

- Cahee Brook and all tributaries from its headwaters to Route 12A

- Spear Brook and all tributaries from its headwaters to the inlet of Mud Pond

- Riford Brook and all tributaries from its headwaters to the confluence with its first tributary

- Toddy Brook from its headwaters to its confluence with Riford Brook

- All unnamed streams that flow through Washington Wildlife Management area from their headwaters to the most downstream management area boundary

- Unnamed tributary to Mitchell Brook within Donner State Forest

- All streams which flow through Amity Pond State Park/Natural Area from their headwaters to the most downstream park boundary

- All named and unnamed streams and their tributaries which flow through the Les Newell Wildlife Management Area from their headwaters to the furthest downstream wildlife management area boundary including Mink Brook, Basin Brook, Stoney Brook, Windfall Brook, Johnson Brook, Perkins Brook, Davis Hill Brook, Taggert Brook, Boutwell Brook, Broughton Brook; however, excepting the section of Fletcher Brook between the brook's confluence with Taggert Brook and the brook's confluence with Broutwell Brook

Appendix E

Agriculture in the White River Basin

Introduction

Agriculture is an important component of the environmental, cultural and economic make-up of the White River basin. Yet its impact carries far beyond the basin boundaries. Land devoted to agriculture makes up 7.5% of the basin's entirety covering an area of over 34,000 acres. This land is growing everything from horses and dairy cows, to pumpkins and vegetables, to hay and cut flowers.

Of all land in Orange County owned by farms, less than half is in crop production. The greater portion is forested land expanding the diversity of production from farm owned land to include forest products, maple syrup and firewood.

The impact of agricultural land on the water quality of the White River has been extensive and has been accumulating for over 200 years. It has only been in the last 15 years that nonpoint source (NPS) pollution from agriculture has begun to be addressed. The major agricultural NPSs are from cropland erosion, contributions from agricultural wastes (including manure and milkhouse waste) and commercial fertilizer, identified nutrients (phosphorus and nitrogen), bacterial and other pathogens, organic matter, toxins and sediment.

The water quality impacts of agricultural NPS pollution are being addressed by a partnership of Federal, State and local organizations. Working together with agricultural producers, the partners are implementing on-farm practices to reduce sediment and nutrient runoff from farmland and better manage wastes, water and land use practices. Limited resources keep implementation to a slow but steady pace yet significant progress has been made in the four years the program has been in place.

Agriculture In The Basin

According to the US Forest Service, 7.5% of basin is in agricultural uses, either as tilled cropland or as hay fields and pasture. A review of the Department of Agriculture, Food and Market's databases indicates there are 354 farm operations or livestock owners in the basin. The number of farms by type is as follows:

Horse	189	Maple Sugar	11
Dairy	102	Christmas Trees	6
Beef	24	Nursery	4
Sheep/Lamb	8	Orchards	4
Sheep/ Dairy	1	Honey	1
Trout	1	Vegetable	1
Ratite	1		

Dairy Operations Under Waste Management Treatment

Since 1995, the department has surveyed dairy farms throughout the state to determine the number of farms that have implemented best management practices to treat animal waste as their farm. In conducting these surveys the number of farms with improved barnyards and manure management systems were determined. The number of animal units these structures have treated as opposed to the total number of animal units in the state were also determined. Out of 102 farms that have installed BMPs in the White River Basin, 67 farms have improved barnyards and 43 farms have waste management systems or manure pits. Many of these improvements were implemented by farmers on their own or with only federal assistance prior to the state providing cost share assistance to build structures.

Table 1. Percent of Animal Units in Dairy Operations Treated

	Farms	Animal Units (AU)	% AU Treated
Total #	102	7270	
With Improved Barnyards	67	1146	15.75
With Manure Pits	43	3806	53.59

Since 1998, 12 farms in the White River Basin have received state and federal cost share assistance. This assistance will fund 26 different practices on these farms. When fully implemented these practices will prevent 700 pounds of phosphorus from entering waterways in the basin. Additionally, these practices will reduce pathogen loading of waterways and assist farmers with managing nitrogen produced on the farm. The financial investment by the farmer, state and federal government will be:

Estimated cost of practices planned or installed	$592,897
Estimated federal contribution	$129,889
Estimated state contribution	$183,854
Estimated cost to producers	$279,154

Crop Production

Most federal agencies publish agricultural statistics by county. No federal agency publishes crop acreage by watershed boundary. Because of this anomaly it is difficult to find one set of numbers that accurately describes crop production in the White River Basin. Several agencies publish statistics that give us a general overview of the acreages within this basin. For example, the Farm Service Agency requires all producers participating in cost share programs to report crop acreages. In 2000, 30 producers in cost share programs from Windsor and Orange Counties, which represent the majority of farmed land in the basin, reported the following crop information:

3740 acres in hay production
3278 acres in corn-silage
2490 acres in haylage
309 acres in alfalfa
188 acres in corn-grain
3 acres in squash
2 acres in cut flowers
5 acres in nursery stock
4 acres in soybeans
2 acres in Christmas trees
1 acre in mixed vegetables
110 acres in rye-grain
110 acres in pasture
97 acres in pumpkins
62 acres in potatoes
20 acres in sudex8 acres in sweet corn

The United States Forest Service estimates that 7.5% of the basin (34,080 acres) is in production. NRCS through the National Resource Inventory estimates between 36,500-79,300 are in agricultural land. New England Agriculture Statistics data in 1991 for Orange County shows 98,352 acres in farms with a total of 41,541 acres in cropland, 29,986 acres of that was harvested.

Using 1991 LANDSAT data, GIS calculates agricultural land use/land cover for the White River Basin. It indicates that approximately 7% of the basin is in agriculture production. The methods of land-use analysis do not enable the reader to account for crop acreages in a precise manner.

Hay/Pasture	19,102 acres
Row Crop	13,122 acres
Orchard	35 acres
Transitional/Brush	750 acres
Other Agricultural	263 acres
	33,272 acres

Historical Highlights
Although the number of farms in Orange County has increased recently, agriculture in Vermont has been decreasing throughout much of the past century. This trend may hit the White River basin as well. Statewide 3422 farms have been lost since 1964, cutting in half the number of acres devoted to farming. This land use change could have a dramatic effect on water quality, by opening the land up to development, urbanization, and sprawl.

Culturally, the change in the landscape reduces the pastoral aesthetic that has made Vermont an attractive tourist destination and could economically impact that industry. These economic impacts of agriculture can be assumed to hold true for the White River Basin. The current 356 farms in the basin can be estimated to be producing goods worth $29 million in market value.

Under current conditions, if resources and assistance remain the same it can be expected that farming in the basin will continue at about the same level as today. The loss of dairy farms seems to be being offset by the increase in other types of farms. Market value of products could continue to grow due to increasing prices, increasing product diversity and increasing sales of value-added products.

Trends for the Future
There are currently 102 dairy farms in the White River Basin. Of these farms, 59 do not have waste management systems. At the current rate of 3 waste management systems per year it will take approximately $1,108.480 and 20 years to complete implementation. The cost is based on a treatment cost of $320 per animal unit for waste management systems and a need to treat 3,464 animal units on dairy farms. Thirty five farms have not yet installed improved barnyards. In order to treat the remaining 6,124 animal units needing treatment at an average cost of $90 per animal unit, it will cost $551,160.

Participation in these programs is voluntary and not all producers are willing to invest in BMP's so we may never have full participation. Manure will never be 100% contained. Storage systems contain wastes produced during the winter spreading ban or when animals are confined. Pasture wastes and spread wastes will always be susceptible to runoff.

With current levels of funding for BMP installation water quality should gradually improve until 2020 when all dairy farms are treated. Levels of phosphorus and nitrogen in surface waters should decrease but will not be eliminated. Further improvements will only come if the funding programs continue and are refocused on other types of farming and annual practice implementation such as riparian treatments and nutrient management are implemented. An increase in support for these programs would decrease the amount of time it will take to reach full nutrient containment.

Appendix F

Trout and Salmon Habitat in the White River Watershed

Trout and Salmon

There are six species of trout and salmon found throughout Vermont. Trout and salmon both belong to the same taxonomic family called "salmonidae", thus these fish species are often referred to as "salmonids". The salmonids found in Vermont are brook trout, rainbow trout, brown trout, lake trout, lake whitefish, round whitefish, and Atlantic salmon. The landlocked salmon is the same species as Atlantic salmon, but has adapted to live its adult life "landlocked" in a lake rather than the ocean. Of these species, the brook, brown, and rainbow trout, and the Atlantic salmon are all found in the White River Basin.

In general, whether the fish lives in a lake, river, or stream, all salmonids need cold, clear, well-oxygenated waters during all life stages. There are other habitat needs, however, that change throughout a salmonids lifetime and differ between species. The discussion below describes general habitat needs for salmonids that are stream dwellers, as is the case for most salmonids in the White River watershed.

Spawning Habitat

Suitable salmonid spawning habitat in streams and rivers is typified by cold well-oxygenated water, and silt-free gravels and cobbles ranging in size from that of a pea to a softball (1-10 cm in diameter). Typically salmonids will lay their eggs at the downstream ends of pools and the upstream ends of riffles where water flows through the channel bed, as a constant flow of water is needed to bring oxygen to the eggs and sweep away waste products. Brook trout, in particular, seek out spawning areas where groundwater wells up through the channel bed, providing a constant source of cold, oxygen-rich water to the eggs and newly hatched sac-fry. Spawning substrates need to be free of silt and sand to ensure that there are open spaces between the gravels through which water can flow during the entire egg incubation period. Water temperatures will naturally be cold during winter and early spring incubation periods, which guarantees maximum oxygen carrying capacity, but temperatures must also be stable to minimize thermal stress and mortality of eggs and fry. It is essential that stream flow is maintained during the winter to prevent freezing and extreme temperature fluctuations. Maintaining groundwater inputs and forested streamside vegetation, which buffers the water from cold winter winds and nighttime air temperatures, also ensures suitable winter water temperatures.

During spawning adult females excavate a pit or "redd" over a ground water upwelling or the tail of a pool in well-aerated gravels. The male fertilizes the eggs as they are deposited, followed by the female covering the eggs with gravel. Eggs may be deposited by one pair over a series of small redds. In Vermont, brown and brook trout spawn in the fall, usually in late September through December, so eggs incubate in the gravel over winter. Rainbow trout spawn in the spring, from March to May. The egg incubation period is temperature dependent. For example, brook trout eggs take about 45 days to hatch at 50° F and 165 days to hatch at 37° F (a typical winter water temperature in Vermont). Newly hatched fry remain in the gravel until their yolk sac is absorbed, then emerge in the spring.

Rearing Habitat

Upon emergence from the gravel, young salmonids move to rearing habitat, also called nursery habitat. They prefer shallow, low velocity areas with rocky substrates, abundant cover, an ample food supply, and a constant flow of cold, well-oxygenated water. Young salmonids seek cover under gravel, cobble, boulders, woody debris, and overhanging bank vegetation. Though strong swimmers, they often seek refuge from fast water behind rocks, logs, or among gravels and cobbles on the channel bottom. Young salmonids also forage along the channel bottom for food, which consists primarily of aquatic insects living among the rocks. They need cold water temperatures, especially during warm summer months, to minimize thermal stress and ensure adequate oxygen content in the water. Constant stream flow, streamside vegetation, and groundwater inputs all help maintain cold water temperatures. In addition, excessive nutrient input, which can lead to abundant algae and bacterial growth, must be minimized to ensure adequate oxygen content in the water. This is more critical in low gradient streams in which the water moves slowly.

Summer and Winter Holding Habitat

When water temperatures rise during the summer months, salmonids move to colder areas of a stream system, such as at the mouths of cold tributaries (often spring-fed), deep pools, and areas where groundwater feeds directly into the stream. These same areas provide important habitat during the winter as well, as the water in these areas maintains a relatively warm 40-50 degrees Farenheit, compared to the near freezing temperature of iced-over rivers. This "warmer" water in the winter is not only important because it reduces cold stress, but is also important in maintaining areas where the channel bed and water column remain free of ice. Young salmonids particularly seek winter refuge in the gravels and cobbles of a stream bottom where they avoid injury from ice buildup and ice and debris flow during thaws. Large salmonids seek cover under larger rocks, undercut banks, and woody debris, usually in large deep pools, where the river is less apt to freeze solid.

Habitat Connectivity

In order to reach summer and winter holding areas, spawning areas, and other habitat needs throughout its lifetime, a salmonid must be able to move from place to place along a river or stream. Adult salmonids living in rivers and large streams often migrate to smaller tributaries to spawn. Young salmonids may spend several years in a tributary and then move to a larger part of the river as they grow bigger. Thus, it is essential that culverts and dams be designed and maintained to allow for fish passage, and that these structures are removed when no longer in use. In addition, thermal barriers that may be created by stormwater outfalls, impoundments and instream ponds should be avoided in areas where habitat connectivity is essential to the survival of the fish population.

Appendix G

Biological Reference Sites in the White River Basin: Biological monitoring data for fish and macroinvertebrate communities from sites listed in the following table were included in a statewide data base used to determine measures of biological integrity describing the range of attainable biological conditions for three categories of wadeable stream (See *Wadeable Stream Biocriteria Development for Fish and Macroinvertebrate Assemblages in Vermont Rivers and Streams,* VTDEC, 2001, for more detailed information regarding biocriteria, biological stream categories, and selection of reference sites). There is no implication that conditions upstream or downstream of these sites demonstrate comparable condition.

Stream Name	Site Location (River Mile)	Drainage Area (km^2)	Elevation (ft)	Macroinvertebrate Stream Category[1]	Town	Water Body ID
Austin Brook	0.2	9.5	1240	SHG	Granville	VT09-02
Bear Wallow Brook	0.2	3	1280	SHG	Granville	VT09-02
Smith Brook	1.3	4.6	1920	SHG	Goshen	VT09-07
White River	1.9	1781	460	WWMG	Hartford	VT09-01
White River	21.8	1080	505	WWMG	Royalton	VT09-01
White River	31.9	513	700	MHG	Stockbridge	VT09-01
White River	32.4	510	715	MHG	Stockbridge	VT09-02
White River 3rd Branch	12.7	257	700	MHG	Randolph	VT09-06
White River 3rd Branch	18.1	74	820	MHG	Braintree	VT09-06

1. Macroinvertebrate Stream Category refers to one of three wadeable streams types as defined by the characteristics of it “minimally disturbed” aquatic macroinvertebrate community. The three categories are:

SHG - Small High Gradient streams;
MHG - Medium size High Gradient streams;
WWMG - Warm Water Moderate Gradient streams and rivers;

Appendix H

The Nine Step Neutral Planning Process
Natural Resource Conservation Service

The Natural Resource Conservation Service (NRCS) provides technical assistance to landowners, units of government or groups in the planning and application of conservation or best management practices to address natural resource concerns. Whether planning a field, a whole farm or assisting with watershed planning, NRCS uses the nine step planning process outlined below. (NPPH Web site)

Preplanning: Prior to a field visit with the landowner, the conservationist, if not familiar with the farm, will review the producer's case file (existing conservation plan, previously applied practices, notes, and issues identified in prior field visits with the producer), aerial maps, soil maps, other maps, watershed reports and other available information to develop a sense of the farm and potential issues.

1) Identify problems – The conservationist meets with the producer to discuss and look at various natural resource problems and opportunities.
2) Identify landowner objectives – NRCS interviews the producer in order to clarify his/her objectives to be sure that the planning process results in satisfying the needs of the farm operation.
3) Conduct resource inventory – Based on the pre-planning assessment, problems identified in step one and the producer objectives, the conservationist will conduct a resource inventory which will include: an inventory of the fields, acres, land uses, soil types and their capabilities/limitations, soil erosion status, water quality considerations, number of animals, volume of manure, review of animal waste management system components and needs, crop production issues, animal needs, riparian/streambank health.
4) Analyze resource inventory data – After gathering baseline data in the field, the planner will analyze the data and provide the producer with a summary of the findings. The producer also provides some of the analysis.
5) Develop alternatives – The producer and NRCS will then begin to identify alternatives which may address the issues identified and which will meet the producer's objectives.
6) Evaluate alternatives – NRCS will provide information including natural resource impacts of the alternatives as well as costs and potential sources of funding to assist the producer in the decision making process. When discussing various cost-share programs, NRCS will provide an overview of the program benefits and requirements. This process may lead to additional resource inventory and/or the development of additional alternatives.
7) Document producer decisions – The producer will decide which options best meet the needs of the operation; NRCS will document these decisions in a conservation plan. If the producer does participate in an USDA cost-share program, an additional supporting document will be developed that outlines the practices, schedule and cost-share allowances for the particular program. Some USDA programs may require a suite of practices to address an issue.
8) Implement plan – NRCS will provide the producer necessary designs, job sheets and specifications to install and apply practices according to NRCS standards and specifications. NRCS will layout the practices as needed and will oversee the practice installation.
9) Evaluate plan – NRCS will follow up with the landowner to evaluate practice effectiveness and to assist with operation and maintenance issues.

Steps 1-6 are best conducted in a “program neutral” manner without the focus or limitation of any one particular program or its requirements driving the discussion or inventory process. Once the resource concerns and their associated alternatives have been identified, the appropriate programs can then be introduced, as needed, to assist with the discussion of costs associated with the implementation of proposed practices. In reality, many producers with particular natural resource concerns do sign up for particular programs which then serve as the impetus of the conservation planning process. NRCS will still use their nine step planning process and will investigate opportunities beyond those that the producer identified through the sign up process

Appendix I

Water Quality Division Interpretation of Water Quality Standards

Under the Vermont Water Quality Standards, the classification (class or type) of surface waters specifies the conditions that must be achieved or maintained for aquatic biota, habitat and recreational uses. Bold font denotes text taken from the Standards and regular font is suggested language to be used in explaining typing to the public. Other water quality criteria shall be achieved in all waters, regardless of their classification.

Classification / *Objectives & Criteria*	**A1**	**A2**	**B1**	**B2**	**B3**
Management Objectives **Aquatic Biota**	**"Consistent with waters in their natural condition."**	**"High quality aquatic biota."**	**"Aquatic biota[1] and wildlife sustained by high quality aquatic habitat with additional protection in those waters where these uses are sustainable at a higher level based on Water Management Type designation."**		
Criteria **Aquatic Biota** (measured by indexes of biological integrity, for fish and bugs)	**"Change from the natural condition limited to minimal impacts from human activity. Measures of biological integrity for aquatic macroinvertebrates and fish assemblages are within the range of the natural condition."** Change from the natural condition limited to minimal impacts from human activity. These waters are our waters in watersheds without significant human activities. Silvicultural practices consistent with AMP's are presumed to meet water quality standards.	"**Change from the reference condition for aquatic macroinvertebrates and fish assemblages shall not exceed moderate changes in the relative proportions of taxonomic, functional, tolerant and intolerant components. All expected functional groups are present in a high quality habitat and none shall be eliminated. All life cycle functions, including overwintering and reproductive requirements are maintained and protected.**" Change from natural condition allowed; however, still supports a diverse community. These waters are protected for use as water supplies. There may be a reduction of biota due to flow reduction, but the remaining populations are of high quality and in the same proportions and functional groups as the reference condition.	**"Change from the reference condition for aquatic macroinvertibrates and fish assemblages shall be limited to minor changes in the relative proportions of taxonomic and functional components; relative proportions of tolerant and intolerant components are within the range of the reference conditions."** Almost natural condition must be maintained. Human activities in these watersheds can be more intense than A1 waters, but of a scale that results in little change to the aquatic biota.	"**Change from the reference condition for aquatic macroinvertibrates and fish assemblages shall be limited to moderate changes in the relative proportions of tolerant, intolerant taxonomic and functional components."** Change from natural condition allowed; however, still supports a diverse community. The change in aquatic biota distribution from reference conditions is slightly more than A2 waters.	

[1] Assumed to be "high quality aquatic biota" since the criteria for B3 waters is the same as the criteria for A2 waters. Management Objectives for A2 waters are "high quality aquatic biota".

Management Objectives **Aquatic Habitat**	**"Consistent with waters in their natural condition."**	**"High quality aquatic habitat."**	**"Aquatic biota and wildlife sustained by high quality aquatic habitat with additional protection in those waters where these uses are sustainable at a higher level based on Water Management Type designation."**		
Criteria **Aquatic Habitat** (physical, chemical, and biological components of the water environment)	**"Change from the natural condition limited to minimal impacts from human activity."** **"Uses related to either the physical , chemical, or biological integrity of the aquatic habitat or the composition or life cycle functions of aquatic biota or wildlife are fully supported."** Change in the chemical composition morphological form, or biological components from natural conditions is limited to minimal change. Only minimal fluctuations in lakes, ponds, reservoirs, and impoundments permitted. Natural flow shall not be diminished by more than 5% of 7Q10. Increases in natural flows shall not result in more than a minimal change in flow.	**"Changes in the aquatic habitat shall not exceed moderate differences from the reference condition consistent with the full support of all aquatic biota and wildlife uses."** High quality habitat maintained. Flow fluctuations permitted when in compliance with Agency rules or procedures or after acceptance of a site-specific flow study. Fluctuations of lakes, ponds, reservoirs, and impoundments permitted to the extent they fully support uses. Increase in natural flow regime shall not result in a change in frequency, magnitude or duration of flows adversely affecting channel integrity or prevent full support of uses.	**"Changes in the aquatic habitat shall be limited to minimal differences from the reference condition consistent with the full support of all aquatic biota and wildlife uses."** Almost natural condition. Flows shall not be diminished more than a minimal amount but not more than 5% of 7Q10 whenever natural flows are equal to or less than 7Q10. Increases in natural flows shall not result in more than a minimal change in flow. Only minimal fluctuations in lakes, ponds, reservoirs, and impoundments permitted.	**"Changes in the aquatic habitat shall be limited to minor differences from the reference condition consistent with the full support of all aquatic biota and wildlife uses."** Small change in the width of the wetted area of stream and in the physical characteristics of the stream such as water depth and velocity. Increase in natural flows regime shall not result in a change in frequency, magnitude or duration of flows adversely affecting channel integrity or prevent full support of uses. Fluctuations in water levels are permitted to the extent that uses are fully supported.	**"Changes in the aquatic habitat shall be limited to moderate differences from the reference condition consistent with the full support of all aquatic biota and wildlife uses. When such habitat changes are a result of hydrological modification or water level fluctuation, compliance may be determined on the basis of aquatic habitat studies."** Substantial change in the wetted area of the stream and the physical characteristics of the stream such as depth and velocity; however, change is limited by the need to maintain aquatic biota as described above. Increase in natural flows regime shall not result in a change in frequency, magnitude or duration of flows adversely affecting channel integrity or prevent full support of uses.

Management Objectives **Recreation** (Boating & Fishing)	**"Highest quality as compatible with waters in their natural condition."**[2]	**"Suitable for good quality boating, and other recreational uses."**	**"Suitable for these uses with additional protection in those waters where these uses are sustainable at a higher level based on Water Management Type designation."**		
Criteria **Recreation** (Boating & Fishing)	**"Highest quality as compatible with waters in their natural condition."** Recreation of waters in their natural condition. This does not preclude management of the fishery by the Agency but does preclude artificial flows for recreation and habitat enhancements and artificial physical impediments.	**"Suitable for good quality boating, and other recreational uses."** Good quality boating, fishing, and other recreational uses. Swimming in these waters pose negligible risk of illness but this use is managed as necessary for consistency with a public water supply.	**"To the full extent naturally feasible without degradation due to artificial flow and water level management or artificial physical impediments"** Boating in the natural condition. Flow fluctuations as defined in aquatic habitat above. No artificial structures are permitted.	**"To the extent naturally feasible with no more than minor degradation due to artificial flow and water level management or artificial impediments, and with appropriate mitigation for artificial physical impediments."**[3] Water withdrawals can interfere with recreation to a minor extent: natural boating with no need for portage unless portage was naturally required (waterfalls). Boating over existing structures must be mitigated.	**"To the extent feasible, and with appropriate mitigation for artificial physical impediments."** Water-level fluctuations or dams can interfere with recreation if mitigation is adequately provided.
Management Objectives **Aesthetics**	**"Water character, flows, water level, bed and channel characteristics, and flowing and falling waters in their natural condition."**	**"Water character flows, water level, and bed and channel characteristics consistently exhibiting excellent aesthetic value."**	**"Water character, flows, water level, bed and channel characteristics, exhibiting good aesthetic value and, where attainable, excellent aesthetic value based on Water Management Type designation."**		
Criteria **Aesthetics**	**"Water character, flows, water level, bed and channel characteristics, and flowing and falling waters in their natural condition."**	**"Water character flows, water level, and bed and channel characteristics consistently exhibiting excellent aesthetic value."**	**"Consistently exhibit excellent aesthetic values."**	**"Consistently exhibit very good aesthetic value."**	**"Seasonal and temporal variability may be allowed provided that good aesthetic value is achieved."**
Management Objectives **Recreation** (Swimming)	**"Highest quality as compatible with waters in natural condition."**	**"Negligible risk of illness due to conditions that are a result of human activities, but managed as necessary for consistency with use as a public water supply."**	"**Suitable for swimming and other forms of water based recreation where sustained direct contact with the water occurs and, where attainable, suitable for these uses at a very low risk of illness based on Water Management Type designation."**[4]		
Specific Restrictions	Not permitted: Waste management zones & on site septic systems > 1000 gallons	Not permitted: Dams or artificial impediments			

[2] For the recreation category in A1 and A2 waters, the language is taken from the management objectives in the Standards. For all other categories and for all Class B waters, language is taken from the water quality criteria section in the Standards.

[3] It is assumed here that existing artificial impoundments must provide mitigation.

[4] The only variation of criteria between B1, B2, and B3 relating to swimming are the aesthetic criteria.

Appendix J

VERMONT STATUTES
TITLE 10: Conservation and Development
CHAPTER 049: PROTECTION OF NAVIGABLE WATERS AND SHORELANDS

§ 1424a. Outstanding resource waters

(a) The board, on its own motion, or upon petition by a state agency, a municipality, or 30 or more persons who can demonstrate an interest under subsection (c) of this section, shall hold a public hearing, in a timely manner, on the question of whether particular waters should be designated as outstanding resource waters, or whether an existing designation should be amended or repealed. The hearing shall be held convenient to the waters in question, or in a county where the waters are located.

(b) Notice and a copy of the petition or board motion shall be provided to the municipality, the municipal and regional planning commissions where the waters are located, and the secretary of the agency of natural resources. The board shall request the clerk of the town or towns where the waters are located to post a copy of the notice. The board may forward the notice and a copy of the petition or motion to any state agency, municipality, organization, or person the board deems appropriate. Notice shall also be published in a newspaper generally circulating in the area where the waters are located not less than 21 days before the date of the hearing. The hearing shall be conducted as a contested case under 3 V.S.A. chapter 25.

(c) In addition to parties in interest, as determined by board rule, the following shall be parties:

(1) those required to receive notice;

(2) those owning property adjoining the waters who, within 21 days of the publication of notice, request to be heard;

(3) those organizations or groups which, within 21 days of the publication of notice, request to be heard and which can establish:

(i) that their members have used or enjoyed the waters in question,

(ii) that designation clearly is of interest to their membership, or

(iii) that they may be affected by a decision on designation.

(d) In making its decision, the board may consider, but shall not be limited to considering, the following:

(1) existing water quality and current water quality classification,

(2) the presence of aquifer protection areas,

(3) the waters' value in providing temporary water storage for flood water and storm runoff,

(4) the waters' value as fish habitat,

(5) the waters' value in providing or maintaining habitat for threatened or endangered plants or animals,

(6) the waters' value in providing habitat for wildlife, including stopover habitat for migratory birds,

(7) the presence of gorges, rapids, waterfalls, or other significant geologic features,

(8) the presence of scenic areas and sites,

(9) the presence of rare and irreplaceable natural areas,

(10) the presence of known archeological sites,

(11) the presence of historic resources, including those designated as historic districts or structures,

(12) existing usage and accessibility of the waters for recreational, educational, and research purposes and for other public uses,

(13) studies, inventories and plans prepared by local, regional, statewide, national, or international groups or agencies, that indicate the waters in question merit protection as outstanding resource waters,

(14) existing alterations, diversions or impoundments by permit holders under state or federal law.

(e) Upon consideration of the evidence, the board shall designate the waters as outstanding resource waters if it finds that they have exceptional natural, recreational, cultural or scenic values. Designation as outstanding resource waters shall not invalidate the terms of existing permits issued by the state or federal government. (Added 1987, No. 67, §§ 3; amended 1987, No. 74, §§ 18.)

Appendix K

Review of municipal and regional plans adopted under 24 V. S. A. Ch 117 in relation to 1) the protection of water resources and recommendations for such plans regarding water resources protection; and 2) the local concerns in the White River Basin Plan.

1). The Two Rivers-Ottauquechee Regional Planning Commission reviewed and evaluated the town plans and zoning regulations of their region for local water quality protection goals, policies, and implementation measures. The plans and regulations were evaluated against a master checklist of water quality and wetland goals, policies, and implementation strategies. A summary was written for each town. The following is an overall summary of the regional planning commission's findings. Almost all of the White River watershed towns are in the Two Rivers-Ottauquechee region, however, the planning commission's region does include towns from other watersheds.

> With limited exceptions, the towns' plans do include a general discussion/inventory of water resources, goals, policies, and recommendations. Few, however, provide detailed assessments on either lake or river protection needs or goals.
>
> Most towns that have local regulations do specify standards pertaining to land uses adjacent to rivers and lakes. These include setback distances from shorelines, buffer strips, and erosion control measures.
>
> All but two towns have flood hazard regulations in effect and are participating in the National Flood Insurance Program. These regulations provide the minimum required design standards for land use activities within the regulated flood hazard areas identified on official Flood Insurance Rate Maps.
>
> The only town in the basin with a lakeshore district is Barnard. Within lakeshore districts, proposed uses are generally evaluated as Conditional Uses, meaning that permits are only issued upon approval from the local Board of Adjustment.
>
> Regulation of agricultural and silvicultural activities is very limited due to the agricultural exemption provision in State law (24 V.S.A. Section 4495), which preempts more stringent local authority over these uses.
>
> No town has a stand-alone wetlands regulation. Several towns have, however, overlay zoning districts regulating land use activities in these areas. The town in the basin with a wetland overlay is Stockbridge.
>
> All towns with active planning programs have a local sewage disposal ordinance providing for a local review and approval of sub-surface wastewater disposal systems.

Despite local awareness and identification of water quality problems and opportunities, most communities within the Region do not have the level of detail incorporated in their plans, regulations, and ordinances that would result in good, consistent water quality and aquatic habitat protection. Educating local planners about the opportunities available to protect or enhance water quality is the greatest need and opportunity resulting from this assessment. More information and technical support from within the community, from regional or agency staff, or from the consultant community is important to provide comprehensive local water quality protection.

2). The basin plan is relevant to the regional plans. The following table shows how the local concerns addressed in the White River Basin plan are also addressed in the regional plans' goals, policies and/or strategies. Similar to the approach of the regional plans, the basin plan provides information to the towns and encourages use of the regional planning commissions.

Regional Plans (date adopted) ***Local Concerns***	**Addison County (1998)**	**Central Vermont (1998)**	**Rutland County (1999)**	**Two Rivers Ottauquechee (1999)**	**Upper Valley Lake Sunapee (1998)**
Stream Bank Erosion		Trees and other vegetation along streams, rivers, and lake shores serve to: … prevent bank erosion, … and maintain the oxygen level of the water for fish habitat… . For these reasons undisturbed areas of vegetation should be retained and encouraged along the banks of surface waters. (pg. 21)	Encourage the creation of buffer zones and greenbelts to protect natural features. (pg. 91) See also subsequent concern.	Preservation of the natural state of streams should be encouraged by the … maintenance of existing stream bank vegetation, together with wildlife habitat. (pg. 60)	Through regulations and easement, communities should create protective areas around water bodies and along watercourses; special attention should be paid to protecting water quality and wildlife habitat. (pg. I-9)
Fisheries	It is the policy of the Regional Planning Commission to encourage: … recognition that the public values provided by surface waters are diverse, and include… recreation, fisheries… ; decisions at all levels of government and in the private sector should protect these values. (pg. 4.1-5)	See previous concern.	Protect, preserve, and restore the natural features in the Rutland Region. (pg. 92) See also previous concern.	Maintain or improve the natural diversity, population and migratory routes of fish. (pg. 63)	Public and private groups should continue to work together to protect recreational water resources … (pg. I-9)
Awareness of Water Quality	It is the policy of the Regional Planning Commission to encourage: … Monitoring of the condition of surface waters. (pg. 4.1-5)	Municipalities are encouraged to establish conservation commissions … to assist in the identification, study, maintenance and protection of important natural resources. (pg. 20)	Define and identify the origins of nonpoint source pollution and support their reduction through public education. (pg. 85)	Promote a single, ongoing monitoring program for surface water quality and quantity that is supported at municipal, basin and regional levels as a network of natural resources. (pg. 58)	The Commission should continue to supply communities with up-to-date mapped water resources information … . (pg. I-10)
Public Access	See Fisheries	Municipalities, the State, and private groups, such as land trusts, should coordinate efforts to provide for improved access to the Region's surface waters. (pg. 78)	…[W]here appropriate, create access to public recreation resources. (pg. 103)	To ensure that access, … regarding outdoor recreational opportunities is available to meet the needs of residents, tourists, and the natural environment. (pg. 79)	…[W]ork with communities to develop access .. to water bodies and watercourses appropriate for public recreational use. (pg. I-18)